View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by University of Illinois at Chicago: Journals@UIC

ISDS 2013 Conference Abstracts

Tool for Detection of Spatio-temporal Clusters of Legionellosis in Toronto: The Legionella Alert Mapping Program (LAMP)

Anne Arthur*, Anna Banaszewska and Effie Gournis

Communicable Disease Control, Toronto Public Health, Toronto, ON, Canada

Objective

To develop an outbreak detection tool which uses spatial information related to temporally clustered legionellosis cases reported in Toronto, Canada.

Introduction

Legionellosis is a respiratory disease that can lead to serious illness such as pneumonia, and can even result in death. Since 2010, increased reports of legionellosis have been received in Toronto during the summer months and led to a five-fold increase by 2012. This underscored the need to rule out common sources through a rapid assessment of exposure data (i.e., locations visited) for any spatio-temporal links. Legionella bacteria from a single source can affect individuals at distances as great as 10 km (1) but dispersion of Legionella bacteria is generally within 1 km of the source (2). This information was used to describe an area of potential risk around each exposure location. Adding temporal information from dates of potential exposures could provide a useful tool for outbreak detection. An automated tool was developed to link spatial and temporal data to assess need for further follow up.

Methods

Legionellosis is a reportable communicable disease in Ontario, Canada as per the Ontario Health Protection and Promotion Act. Notifications of Legionella cases are received and investigated to assess all possible exposure sites during the relevant incubation period. These data are captured in the mandatory provincial information system, iPHIS, which was used to extract all cases reported to Toronto Public Health between June 1, 2013 and August 14, 2013. Data were collated in SAS on a daily basis to be used for outbreak detection. ArcGIS 10.0 was used to analyze the data and an alerts creation model was completed using ArcGIS Model Builder.

Legionella exposures for each case were first mapped by latitude and longitude coordinates of the postal codes and 1 km buffers were created around each of the exposures for each case. A series of intersects were preformed to uncover any exposure with buffer overlaps. The resulting map displays all exposures from different cases that are within a 1 km radius of each other and a detailed line list of case information from the resulting Legionella cluster can be generated.

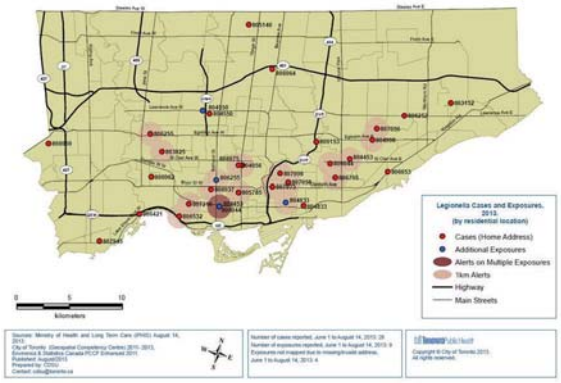
Results

When case and exposure data were analyzed and displayed graphically (Figure 1), a number of alerts were generated based on overlaps in the 1 km buffers between cases and exposures. The majority of these alerts were deemed insignificant, and did not warrant further public health investigation. Only one common exposure location, a large hospital in downtown Toronto, was reported by two cases. This triggered an in depth investigation including environmental sampling; no evidence to confirm the location was the source for both cases could be found.

Conclusions

The development of LAMP enabled an automated visualization of Legionella case exposures across Toronto, to facilitate the rapid detection of potential spatial clusters. So far in 2013, one significant alert was generated, but no common source exposure was confirmed upon completion of the investigation. The use of LAMP as a complementary tool for epidemiological surveillance of infectious diseases holds great promise.

Figure 1: Reported cases of legionellosis, and exposure locations. Toronto, June 1, 2013 to August 14, 2013.



Keywords

Spatial Analyses; Outbreak Detection; Legionnaire's Disease; Epidemiology

Acknowledgments

We wish to thank Communicable Disease Control program staff at Toronto Public Health for their efforts related to data collection and quality assurance.

References

1. Nygard, K. et al. Clinical Infectious Diseases 2008; 46:61–9.
2. World Health Organization. Legionella and the prevention of legionellosis, 2007.

*Anne Arthur
E-mail: aarthur@toronto.ca

ISDS Annual Conference Proceedings 2013. This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 3.0 Unported License (http://creativecommons.org/licenses/by-nc/3.0/), permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.